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10/801,861	03/17/2004	Saku Egawa	503,4366X00	1977
20457	7590	05/01/2008	EXAMINER	
ANTONELLI, TERRY, STOUT & KRAUS, LLP			PECHE, JORGE O	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/801,861	EGAWA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	JORGE O. PECHE	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 10 January 2008.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-21 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-16 is/are rejected.  
 7) Claim(s) 17-21 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 03/17/2004 and 01/10/2008 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>02/21/2008</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____ .

## DETAILED ACTION

1. Receipt is acknowledged of applicant's argument/remarks filed on January 10, 2008, claims 1-14 are pending and an action on the merits is as follows.

Applicant's arguments with respect to amended claims 1-14 have been fully considered but are moot in view of the new ground(s) of rejection. Applicant has amended **claim 1** and added **claims 15-21**. Drawing objection has been withdrawn.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims **1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hwang et al. (Patent: 5,568,589)** in view of **Bisset et al. (Patent No.: 6,671,592 B1)**.

Regarding **claim 1**, Hwang discloses a self-propelled cleaning machine with fuzzy logic control comprising:

- Wheel motors (10a and 10b) (moving means) for moving a cleaning machine (see col. 1, lines 31-41; col. 1, line 65 - col. 2, line 9; Figures 1A-1C, 2, and 4A-4B).

- Control device (12) and running control circuit (14) (control means and driving means) for controlling the self propelled cleaning machine (see col. 1, lines 42-57; Figures 1A-1C, 2, and 4A-4B).
- A direction sensor (23) (orientation angle detection) for detecting the change in the running direction of the cleaning machine (see col. 1, line 65 – col. 2, line 9; col. 2, lines 22 – 30; col. 2, lines 56-65; col. 5, lines 15-24; Figures 1A-1C, 2, and 4A-4B).
- A plurality of distance sensors (3a-3g) (wall surface detection means) for sensing the presence of an obstacle (see abstract; col. 4, lines 28 – 34; col. 5, lines 25 – 33; Figure 4A – 4B).
- Control device (12) for moving the cleaning machine across the room perimeter (rectangular travel path) and defining a running path (PATH2) by connecting the ends of the parallel lines (LINES) in alternating direction (see col. 5, lines 1 – 24; col. 6, lines 4 – 16; col. 6, lines 40 – 63; Figures 5A-5D).

However, Hwang fails to disclose wherein the control means determines rectangular spiral travel paths based on an orientation angle detected by the orientation angle detection means when the control means and causes the cleaning device to travel along the rectangular spiral travel paths for cleaning a room including travel alongside the wall surface which partitions the room to be cleaned and which is detected by the wall surface detection means, and the driving means drives the cleaning device such that it moves along the travel path.

However, Bisset teaches an autonomous vehicular appliance comprising a means for allowing the robotic vacuum cleaner to navigate itself around the room avoiding any obstacles in its path in a generally inwardly spiral path (see col. 5, lines 34-53; Figure 5A).

Given the teaching of Bisset, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hwang' invention to include a spiral trajectory system within a robot cleaner

Doing so would enhance a self-propel cleaning machine capable to avoid obstacle by implementing a spiral trajectory.

Regarding **claims 2 and 3**, Hwang discloses a plurality of distance sensors (3a-3g) (wall surface detection means) for sensing the presence of an obstacle. As the obstacle is detected, it would be inherent for the cleaning machine to move alongside (left or right) the obstacle to avoid contact (see abstract; col. 4, lines 28 – 34; col. 5, lines 25 – 33; Figure 4a – 4b).

Regarding **claim 4**, Hwang discloses a RAM unit (27) for storing wall coordinates, in which the CPU (24) define the area to be clean as a polygon consisting of lines connecting the stored center coordinates X (see col. 6, lines 26 – 48; Figure 5A – 5D).

Regarding **claim 5**, Hwang discloses a method for operating a self-propelled cleaning machine with fuzzy logic control comprising the step of:

- Causing the cleaning machine to travel across the room perimeter and in parallel line trajectories (plurality of looping travel paths) (see col. 5, lines 14-33; col. 6, lines 4- col. 7, lines 7; Figures 5A – 5D).
- Detecting reference direction across the room perimeter (see col. 5, lines 1-33; col. 6, lines 4- col. 7, lines 7; Figures 5A – 5D).
- Determine the parallel line trajectories for the cleaning machine (see col. 6, lines 40 - col. 7, lines 7; Figures 5A – 5D).

However, Hwang fails to disclose a method for operating a self-propelled cleaning device capable of autonomous movement, comprising the steps of: causing the cleaning device to travel along a plurality of looped travel paths including travel routes along a pair of opposing wall surfaces.

However, Bisset teaches an autonomous vehicular appliance comprising a means for allowing the robotic vacuum cleaner to navigate itself around the room avoiding any obstacles in its path in a generally inwardly spiral path (see col. 5, lines 34-53; Figure 5A).

Given the teaching of Bisset, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hwang' invention to include a spiral trajectory system within a robot cleaner

Doing so would enhance a self-propel cleaning machine capable to avoid obstacle by implementing a spiral trajectory.

4. Claims **6-10** are rejected under 35 U.S.C. 102(b) as being unpatentable over **Hwang et al. (Patent: 5,568,589)** in view of **Bisset et al. (Patent No.: 6,671,592 B1)** as applied to claims above, and further in view of **Jones et al. (Pub No.: US 2003/0025472 A1)**.

Regarding **claims 6 - 8**, Hwang discloses a method for operating a self-propelled cleaning machine with fuzzy logic control comprising the step of:

- Detecting wall surface by implementing a plurality of distance sensors (3a-3g) for sensing the presence of an obstacle. As the room wall is detected, it would be inherent for the cleaning machine to move alongside (left or right) the wall/obstacle to avoid collision by implementing direction sensor (23) (see abstract; col. 4, lines 28 – 34; col. 5, lines 25 – 33; Figures 4a – 4b).
- Making a plurality of spiral travel turns across the room perimeter (first/second horizontal movement path and first/second vertical movement path) after the wall surface is detected (see col. 5, lines 1 – 24; col. 6, lines 4 – 16; col. 6, lines 40 – 63; Figures 5A-5D).
- As the cleaning machine move across the room perimeter, it would be inherent that the direction sensor (23) in coordination with control device (12) would set the correct turning direction for the cleaning machine to accomplish its trajectory (see Figures 5A-5B).

However, Hwang fails to disclose a self-propelled cleaning device comprising the step of taking a plurality of spiral travel paths which partially overlap with each other.

However, Jones teaches a method and system for multiple-mode coverage for an autonomous robot comprising the steps of taking a plurality of spiral travel paths which partially overlap with each other (see page 5, par. 65; Figures 6C, 11, and 14).

Given the teaching of Jones, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify Hwang' invention to include overlapping spiral trajectory paths

Doing so would enhance a self-propel cleaning machine capable to avoid obstacle by implementing a spiral trajectory with multiple coverage.

Regarding **claims 9-10**, Hwang discloses a method for adjusting the cleaning machine trajectory path across the room before begin cleaning (first horizontal movement path) (PATH1) by implementing a position discrimination circuit (15) and RAM unit (27). Unit (27) is capable to store wall coordinates, in which the CPU (24) define the area to be clean as a polygon consisting of lines connecting the stored center coordinates X (see col. 6, lines 26 – 48; col. 6. line 53 – col. 7, line 7; Figure 5A – 5D).

Given the teaching of 3XX, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify 1XX' invention to  
Doing so would enhance

5. Claims **11-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hwang et al. (Patent: 5,568,589)**.

Regarding **claim 11**; Hwang discloses a method for making a plurality of spiral travel turns across a room perimeter (first/second vertical movement path) after the wall surface is detected. As the cleaning machine moves across the horizontal paths, which can be vertical paths as the Figure 5D is rotated, there is an odd-number multiple of the space interval between the adjacent looped travel paths (see col. 5, lines 1 – 24; col. 6, lines 4 – 16; col. 6, lines 40 – 63; Figures 5A-5D).

However, Hwang fails to disclose or depicts an interval between two-movement paths as an odd-number multiple of half of the interval between the two adjacent looped travel paths.

However, the control device (12) can be programmed to drive the cleaning machine such as the interval space is an odd-number multiple of half of the adjacent looped travel paths.

Doing so would enhance a self-propelled cleaning machine capable to cover more area per total number of looped travel paths.

Regarding **claim 12**, Hwang depict an interval between two adjacent looped travel paths as a one times the widths area clean by cleaning machine (see Figure 5D).

Regarding **claims 13-14**; Hwang discloses a method for operating a self-propelled cleaning machine with fuzzy logic control, which uses wheel motors (10a and 10b), control device (12), running control circuit (14), a direction sensor (23), a plurality of distance sensors (3a-3g) (wall surface detection means), a plurality of wall surface segments (see abstract; col. 1, line 65 – col. 2, line 9; col. 2, lines 22 – 30; col. 2, lines

56-65; col. 4, lines 28 – 34; col. 5, lines 15-24; col. 5, lines 25 – 33; Figure 4A – 4B)  
comprising the step of:

- Moving the cleaning machine (first step) until it approaches a wall (see col. 6, lines 4-26; Figure 5A).
- Moving and rotating (right/left side and/or around the obstacle) (second step) the cleaning machine across the room (walls) (see col. 6, lines 4-26; Figure 5A).
- Comparing the rotation angle of the cleaning machine with the intended direction path of the cleaning machine (second step) by implementing apposition discrimination circuits (15) and direction sensor (23).

However, Hwang fails to disclose a method for selecting the result of comparison to be equality when the first direction is clockwise and the second direction is right-side, or the first direction is counterclockwise and the second direction is left-side, and a fourth step of rotating the cleaning device by a prescribed angle and repeating the process from the first step when the result of comparison in the third step is equality.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to generate a computer program (C++ language) to select a result of the comparison to be equal when the first direction is clockwise and the second direction is right side or the first direction is counterclockwise and the second direction is left side, which is a well known technique for rotation and turning comparison.

Furthermore, as Hwang discloses a method for rotating the cleaning machine to a determine angle to correct angular deviation (see col. 6, lines 64 – col. 7, lines 13), it

would have been obvious to one of ordinary skill in the art at the time of the invention was made to generate a program (IF or WHILE condition) for repeating a process from the moving process (first step) when the result of comparison in the comparison process (third step) is equal.

Doing so would enhance a self-propelled cleaning machine capable to autonomously rotate and direct its system.

6. Claims **16-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hwang et al. (Patent: 5,568,589)** in view of **Bisset et al. (Patent No.: 6,671,592 B1)**.

Regarding **claims 15-16**; Hwang fails to disclose all limitations.

However, Bisset teaches an autonomous vehicular appliance comprising a means for allowing the robotic vacuum cleaner to navigate itself around the room avoiding any obstacles in its path in a generally inwardly spiral path (see col. 5, lines 34-53; Figure 5A). Under this apparatus, it would have been obvious to one of ordinary skill in the art at the time of the invention to understand that the robotic vacuum cleaner would include a first and second horizontal movement paths and a first and second vertical path to move along the wall surfaces.

Given the teaching of Bisset, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hwang's invention to include a spiral trajectory system within a robot cleaner

Doing so would enhance a self-propel cleaning machine capable to avoid obstacle by implementing a spiral trajectory.

***Allowable Subject Matter***

Claims **17-21** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Argument***

In the Applicant's arguments filed on January 10, 2008, with respect to the rejections of claims 1-14 under 35 U.S.C. 102(b) and 103(a) as being unpatentable over **Hwang et al. (Patent: 5,568,589)** have been fully considered but are not persuasive.

Regarding Applicant's first argument (page 12, par. 3), "Before proceeding to the rejection based on prior art, applicants note that dependent claim 10 does not stand rejected in the office action, in that there is no statement of a ground of rejection, as required by 35 USC 132 and 37 CFR 1.104(c). Thus, in the absence of a statement of rejection of claim 10, such claim is considered allowable." The Examiner respectfully disagrees. A thought reading of first Office Action reveals that what is argued is clearly supported.

Regarding Applicant's second argument (page 13, par. 2), "Specifically, Hwang does not disclose or teach a self-propelled cleaning device comprising rectangular spiral

travel paths, ....” The Examiner respectfully disagrees. The Applicant is kindly invited to consider the above Office Action to view the new ground of rejection.

Regarding Applicant’s third argument (page 14, par. 2), “Hwang does not disclose or teach a plurality of looped travel paths including travel routes along a pair of opposing wall surfaces.” The Examiner respectfully disagrees. The Applicant is kindly invited to consider the above Office Action to view the new ground of rejection.

Regarding Applicant’s fourth argument (page 15, par. 2), “the Examiner has not asserted that Hwang discloses or teaches the feature of a method of operation for a self-propelled cleaning device wherein the cleaning takes a plurality of spiral travel paths which partially overlap each other.” The Examiner respectfully disagrees. The Applicant is kindly invited to consider the above Office Action to view the new ground of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jorge O. Peche whose telephone number is (571)270-1339. The examiner can normally be reached on 8:30 am - 5:30 pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Khoi H. Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jorge O Peche/  
Examiner, Art Unit 3664

April 25, 2008

/Khoi H Tran/  
Supervisory Patent Examiner, Art Unit 3664